The Status of Technology Education in New Zealand Secondary Schools: New age focus

Sandie Gusscott

Introduction

Technology Education has its history in technical subjects, science and the relatively new subject of information technology. The status of science is well established as an academic subject. Information technology has status because it is a powerful tool for knowledge. The technical subjects, however, have always been considered vocational, and therefore carry less status than the more academic sciences, languages and mathematics.

This paper explores the present status of the subjects in *Technology in the New Zealand Curriculum,* based on what has happened in the past and gives suggestions for its future status.

Technical Subjects in the Past

Technical subjects in the past held little status because they were considered to be vocational. The schooling system in New Zealand was based on the English system, where ‘pure’ subjects were recognised. The secondary public and grammar schools in England focused on academic subjects, whereas the secondary technical schools had their main focus on vocational and commercial subjects. Part of the difference between the academic and vocational subjects stemmed from the historical perceptions of mental versus manual, with the former seen as carrying higher status (Preston & Symes, 1992). Technical schools were developed for the workers and had their origins in the Industrial Revolution where employers wanted workers to be punctual, reliable and able to follow instructions (McGee, 1997).

The dominant group, who were the academics, recognised the pure subjects (mathematics, languages and chemistry), by conferring higher degrees upon them such as honours degrees. The impure subjects, such as economics, were conferred only a

general degree and were therefore considered to have lower status (Bernstein, 1971). The degree system reflected the distribution of power and how society was controlled. Technical subjects did not feature in this hierarchy, with no degrees available.

The New Zealand secondary school system was modelled on the elitist English secondary school model (Nolan et al, 1992). In New Zealand, the class system was reflected in the grammar and technical schools. Since there were no major manufacturing industries the technical schools were seen as a way of getting noisy youth off the streets and giving them useful discipline. This created an under-class because they were excluded from being involved in the knowledge of most worth – the academic knowledge. The grammar schools, on the other hand, prepared students for university and white-collar jobs. The grammar schools and high schools reinforced their status by publicly stating that their schools were better.

In 1926, W.J. Morell, the Rector of Otago Boys' High School, told his Board that he was confident that his school would continue to be seen by the public to 'service the professional, official or business classes' while the local technical school would be seen 'to cater for the artisan or lower commercial classes. Miss King, the Principal of Otago Girls' High School, was equally sure that "as a general rule, those who go to the Technical School belong to the labouring class; those wanting a 'nicer' education go to the High School" (McKenzie, 1992:34).

In the secondary school system, students from different classes only had access to certain subjects (Bernstein, 1971). School taught students in technical schools to stay in the working class and come out into a working class job. Later, when technical schools were assimilated into general education, much of their stigma remained. They continued to offer a variety of subjects, including academic, but were not considered to be of as high a status as the high schools and grammar schools. McKenzie (1992:35) quoted Maurice Gee as capturing the public perceptions of the 1920s in Auckland when he wrote, 'The grammar boys would be doctors and lawyers, some of them, while the Seddon boys would be butchers and bricklayers.'

The technical subjects were considered to be second class compared with the academic subjects. Vocational education was not regarded as important in the New Zealand hierarchy. The school curriculum was captured by the upwardly mobile. Students of technical high schools came from working class families, while traditional schools were considered to provide the leaders of New Zealand. The Labour Government of 1935 felt that social and class differentiated schooling was entirely unacceptable. McKenzie (1992:38) stated that 'reform took place if, and only if it was seen to have strong support from schools and teachers.' Reform has been slow but has been evolving.

After the Thomas Report in 1944, when core subjects for the first two years of secondary schooling were introduced, the distinction between grammar and technical schools became more blurred (McGee, 1997). A method of streaming was introduced in subsequent years which continued to favour the middle and upper class groups. Students who achieved poorly in entry tests into secondary schools were placed in the commercial and technical classes, and those who achieved well were expected to take more academic subjects such as languages, sciences and mathematics (Bell & Carpenter, 1994). The grammar schools continued to offer predominantly academic subjects and moulded themselves on the English public school system. Some secondary schools, such as Seddon, still continued to provide a predominantly commercial/technical programme (McKenzie, 1992).

The content of the subjects also differed. In the technical room students were rewarded for being punctual, obedient, docile, hard working and following instructions. There was no critical thinking, creativity or analysing how or why (Anyon, 1987). The children of the working class, who attended these classes, had their educational opportunities restricted rather than expanded and were taught their subordinate position on the social class structure (Bell & Carpenter, 1994). This helped to prepare them to become workers. Unfortunately, industry did not necessarily employ students who had been through this process and instead preferred an apprenticeship style of learning. Teachers in executive elite schools, such as grammar schools, offered more academic subjects such as mathematics, which developed

students reasoning powers and understanding of concepts so that they were better prepared for university and positions of power (Anyon, 1987).

Secondary Schools Today

Even today, the fact that some schools are better off than others is recognised through the decile rating of a school. This decile rating comes from a random sample of student addresses matched against census socio-economic status data. The purpose of the rating is to identify the level of 'top up' funding needed in addition to the operations grant from the Ministry of Education. If the school is in a 7 to 10 decile rating it is considered to have better funding from its community than a school that is rated 1 to 4. These ratings tend to link with social classes and have been established to address inequities that have arisen through the community income levels that the students come from (Benson, 1999). In Auckland, a school in South Auckland, a traditional working class area, is more likely to have a low decile rating than a school which is located in Remuera, an area where more affluent people are likely to live.

In New Zealand, teachers' attitudes to the different subjects have directly correlated to the status that they have. This has been reinforced as staff have competed for strategic teaching resources (Bernstein, 1971). Teachers of science and mathematics subjects were considered to have high status and were therefore given higher salaries compared with teachers of vocational subjects, such as woodwork and home economics who held lower status. Even today equity with positions of responsibility for all subjects is rare. Most positions of responsibility for technology education advertised in the Education Gazette are not above a PR2.

With our changing world, aspects such as perfecting a limited range of skills, are not as relevant for the future. The change in our society and workplace has meant that, whereas before what was required was a submissive and inflexible person, what is now required is a more flexible and multi-skilled person. (Bernstein, 1971) To live in today's world, people – including those in industry - need to be adaptable, creative, multi-skilled and able to problem solve. People no longer have one job for life. The class system, to a certain extent, is being broken down with organisations adopting a flatter management structure, which in turn is causing shifts in the social order.

Separating knowledge from its use as the academic organisations have done in the past, is too slow for the quickly changing external demands of today (Young, 1998). Experiential and work-based learning is becoming more the norm. Young (1998), suggests that participation in a 'community of practice' involving 'learning as a social participation' would allow people to learn how to learn and develop life long learners. This would help equip people to deal with an ever-changing world.

As the information technology explosion has impacted on our world, governments have seen the need to review their education structures. In the early 1990's support for technology education came from powerful sources outside education – governments and industry - although not all had a clear understanding of what it involved, with many linking it only to information technology (Layton, 1994). UNESCO began to construct a research base, which could be used to inform technological practice, comparable to what has already been established for mathematics and science. This groundswell, and in particular the support from OECD countries, meant that technology education was to be considered as a curriculum in its own right. OECD countries began to develop curriculum for technology education as part of their national curricula (Layton, 1994).

The Curriculum Framework

Technology was mentioned as a separate learning area for the first time when the Ministry of Education released *The National Curriculum of New Zealand, A Discussion Document* (1991). At that stage schools had little idea of what technology as a subject would involve, but Dr Lockwood Smith 'insisted on its importance as a way of promoting national economic competitiveness (McKenzie, 1992:38).

The New Zealand Curriculum Framework was released in 1993. Dr Lockwood Smith announced that the compulsory curriculum would be extended to Year 10 as each of the curriculum statements were introduced (Ministry of Education, 1993). Technology was one of seven essential learning areas. Subjects that were technical and previously held little status, suddenly had the potential to gain some. The previous subjects of metalwork, woodwork, sewing and cooking were not mentioned. Instead we had new

names: materials technology, production and process technology, structures and mechanisms, and food technology. I suggest that the change in name was deliberate so that people would not equate the vocational subjects of the past with technology education in the present. Electronics and control, biotechnology and information and communications technology added to these made up the seven technological areas.

Schools' perceptions of technology and technology education influenced the way they went about implementing the curriculum. In 1993, before the draft technology curriculum was written, money from a professional development pool was put up for tender. The four secondary schools that were successful in becoming pilot schools for technology education spent most of their money on purchasing computers and upskilling their staff on the use of them (Hawk, 1997). These schools did not have a draft curriculum to refer to at the time and interpreted the curriculum as being computer-linked. After the technology curriculum was released in 1995, most stakeholders (teachers and principals) still had a narrow view of technology education, seeing it as equipment – such as computers, problem solving or technical skills (Gusscott, 1996).

New Zealand was able to benefit from research that had already been carried out by other countries, as well as research carried out by Dr Alister Jones and Dr Malcolm Carr of the University of Waikato. The curriculum that was developed demonstrated this broad view of technology education. The definition states:

> Technology is a creative, purposeful activity aimed at meeting needs and opportunities through the development of products, systems, or environments. Knowledge, skills, and resources are combined to help solve practical problems. Technological practice takes place within and is influenced by, social contexts (Ministry of Education, 1995:9).

The core curriculum from Year 1 to 10 ensures that every student is exposed to the technological areas. There are eight objectives in the technology curriculum: four of these emphasise knowledge, two technology and society, with only two objectives included for technological capability. Even though one of the technological capability

objectives has been subdivided into four parts, some people misconstrued the intent of the curriculum, and percentages of time were given to the objectives. All of a sudden it looked as if a lot of the 'hands on' was gone, as more percentage of time was perceived to be devoted to technological knowledge – some people were worried that it was too theoretical and the craft would be lost.

The knowledge focus of the curriculum helped to give it status. Knowledge of materials and technological practice was included, as well as technological principles and systems. A component of the curriculum was to develop critical and creative thinking in students. This in itself made technology a more academic subject. Previously only affluent parents expected their children to have opportunities to discuss and challenge ideas as part of their schooling. The development of knowledge was to be situated in a relevant setting for the student, and could be used to help the working class understand their own social setting and how they could improve themselves (Bell & Carpenter, 1994).

Teachers, and some of the public, saw the introduction of the technology curriculum as a means of dummying down the practical side of technical subjects. Parents felt that manual classes at intermediate schools provided their children with a good base of life skills. Anne-Marie O'Neill went so far as to say it was, 'deskilling of our young people in their abilities to prepare and cook food' (O'Neill & Jolley, 1996/97:237). This was not the case. In fact, the potential of the new curriculum, was to give more status to the previous technical subjects and remove some of the stigma of vocational and working class. There is no reason why a more analytical and critical approach could be included in technology education so long as the curricula is relevant to students every day thinking (Bell & Carpenter, 1994).

As a result of the Minister's announcement that technology should be a core subject, teachers started to lobby for the inclusion of the technology curriculum into their departments. Although other curricula (Mathematics, Science and English) had already been introduced, these subjects had not threatened the very structure of schools. Technology, which drew on a number of subjects in different ways, challenged the present school structure (as well as introducing new subject areas such

as production and processes, electronics and control and biotechnology). Some secondary schools reorganised their departments and developed faculties based on the seven essential learning areas. In these schools a technology department or faculty was formed incorporating teachers for each of the technological areas. Often a PR equivalent to other faculty or department heads was conferred (Ministry of Education, 1998).

The writers themselves were unsure about how the curriculum would be implemented. Originally the intention was that a cross-curricular approach would be used (Jones, 1993). Schools had to consider the most effective way of implementing the technology curriculum. At present most schools teach technology education through different departments. Often biotechnology and electronics and control are taught by the science teachers in the science department, information and communications technology by the English department, and text and information by the computer department. The home economics, workshop and graphics and design teachers teach the other technological areas. Other schools chose to teach all technological areas in one room so those students learning technology education could associate it with a space.

The developers of the curriculum recognised that it would require 'status equal to other subjects' (Jones, 1993:6). This meant not just when offering programmes, but also with the personnel involved. Senior management support was considered crucial, as was teachers' willingness to change. The Ministry of Education injected substantial funds into teacher professional development and found that the following criteria helped implementation to be more successful:

- accepting that technology was compulsory;
- delivering the curriculum in substantial sections rather than dissipating it across the curriculum;
- putting senior leadership for technology education in the hands of the upper or middle management who had prestige;
- having a supportive principal;

- having enthusiastic staff;
- planning by cross curricula teams for stand alone technology units;
- developing a comprehensive staff plan;
- making a conscious effort to involve parents and wider community;
- identifying schools at the forefront and using them to provide inspiration and leadership for other schools (Brown, 1999; Treagust & Rennie, 1993;Ward, 1997).

The technical subjects of the past focused on preparing women to be child-rearers and domesticated, and for men to work in industry (McCulloch, 1998; O'Neill & Jolley, 1996/97). The technology curriculum of today is asking teachers to motivate, challenge, encourage and support students. They should be encouraging lateral thinking and creativity as well as developing critical thinking. Teachers should be empowering their students so that they can make informed decisions (Ministry of Education, 1995). There is a stronger emphasis on enterprise than in previous syllabi, in line with the government of the day's thinking. However, educational and social emphasis is also strong. As mentioned previously, our society is changing and if our schools do not change with it we are doing our students a disservice by not equipping them to meet the many demands of life today. There is a danger, however, that as the status of technology education increases it could deny access to some of the students who would have taken it if the status was lower (McGee, 1997).

Technology Education New Zealand (TENZ)

In 1944, The New Zealand Geographical Society was formed as a subject association to promote and publicise geography. This society was instrumental in the acceptance of geography in New Zealand schools (McCulloch, 1992). Technology educators realised that an association also needed to be established for technology education in order to prevent fragmentation and provide an umbrella for each of the subjects within it. The primary interest of subject associations is to promote curriculum issues. Technology Education New Zealand (TENZ) is a professional network which was set up to promote and support technology education in New Zealand (Technology Education New Zealand, 1997). It is a network, which promised to:

- foster the development of Technology in the New Zealand Curriculum;
- develop and maintain national and international links between those working in Technology Education and with the wider technological community;
- support professional, curriculum, and resource development in Technology Education;
- encourage research in Technology Education;
- organise a national Technology Education conference on a biennial basis.

In 1997 the inaugural Technology Education Conference was held in Christchurch and attracted over two hundred and fifty attendees. At the recent Technology Education Conference held at King's College in Auckland, there were over four hundred attendees. These people came from Primary, Intermediate and Secondary schools, as well as Colleges of Education, Universities, Ministry of Education and businesses. They represented all areas of technology education. International delegates came from Israel, United States of America, various states of Australia, Taiwan and International Schools (TENZA, 1999a). This list indicates that there is a lot of interest in technology education nationally and internationally. A third conference has been planned to take place in Wellington in 2001 and a similar number of attendees is anticipated. This is encouraging for the status of technology education.

TENZ has the support of the Royal Society of New Zealand, which is an independent body created by statute and has been in existence in its own Act since 1867. 'The society consists of New Zealand's national academy of science and technology fellows and a membership which include scientific and technological professional societies, individuals and regionally based branches' (TENZA, 1999b:4). The trust board has worked hard to ensure that technology education is accepted by the academics, the concern is that in the process some of the teachers who come from a more vocational background may feel uncomfortable about being included (Bell & Carpenter, 1994).

Qualifications

New Zealand has modelled its qualification system on the English system, where degrees are conferred for academic studies. Previously, as in England, honours degrees were only conferred on the more elitist subjects such as languages, chemistry and mathematics. The qualifications which have status in New Zealand secondary schools are School Certificate and Bursary.

Originally these were written examinations, although there has been a trend in recent years for some internal assessment so that practical work can be included. When this was included, lower decile schools felt that this type of assessment was more equitable, but highly ranked decile schools believed in the more academic written examinations which gave them the market edge (Thwaites, 1997).

The Education Amendment Act (1990), established an independent statutory body – The New Zealand Qualifications Authority. This authority established a Qualifications Framework built on defined standards (Codd, 1996). The framework showed no distinction between academic and vocational as all qualifications became transferable units of learning. The original intention was the removal of examinations, as we have known them in the past, i.e. two to three hours of written examination with no practical component. It has been suggested that the Ministry of Education wanted to remove the stranglehold that universities have on education, and what is considered to be the social organisation of knowledge. Those who have the power over knowledge can control the social organisation of a country (Esland, 1971).

Unit standards did not sit well with the universities who felt that, ‘a fragmented collection of ‘bits of knowledge’, could totally destroy the meaning and integrity of tertiary qualifications. Essentially it threatens to destroy the very concept of a degree’ (Codd, 1996:63). Unit standards do have their problems – especially in the area of academic knowledge. However, the notion of streamlining qualifications and recognising a variety of assessment methods should make gaining qualifications more accessible to those who previously would not have been eligible.

Technology education, and in particular TENZ, worked quickly towards establishing unit standards for their subjects as they saw it as a step towards gaining status. In 1997, unit standards were developed for each of the technological areas. There are 27 standards in all: three Core standards which reflect Technological Practice at level 1, 2 and 3, and similarly three for each of the following Technological Areas: Information and Communication Technology, Structures, Mechanisms, Production and Processes, Materials Technology, Food Technology, Biotechnology, and Control Technology (Technology Education New Zealand, 1997).

Universities and the New Zealand Education Forum have lobbied strongly against unit standards. Teachers objected to the workload involved in their full implementation, even if they approved of them in principle (Benson, 1999). The result of general dissatisfaction with unit standards has been a new qualification system. Wyatt Creech announced in a Media Release on 5 November 1998:

> The new qualifications system, dubbed Achievement 2001, contains the best in assessment and learning in our schools at the moment. It will give every student the potential to make the most of their education, and give them qualifications to help set them up well for the future. The new system centres on the National Certificate of Educational Achievement. It will become the mainstay of secondary school qualifications in the 21st Century. All learning in the senior secondary school, and beyond, will generate credits towards the National Certificate of Educational Achievement.

The National Certificate of Educational Achievement will have four levels at secondary school. Level One being for most Year 11 students, Level Two for most Year 12 students and Level Three for most Year 13 students. A fourth level for highest achieving students only will be ‘Scholarship’. School Certificate and Bursary examinations will remain (Creech, 1998). This implies that the elitist system will continue with those gaining a scholarship being able to get higher rewards.

Within the National Certificate, Achievement Standards will be used to measure achievement in internal and external assessment for each curriculum subject. They will recognise excellence by grading achievement. Unit Standards will remain, for measuring success in non-conventional subjects. Success in Unit Standards will earn a student recognition at Level One, Two or Three of the Certificate. Wyatt Creech announced that schools could offer courses that combine achievement standards and unit standards. There is a difference between the two, and again elitism could reign as schools and possibly employers will recognise achievement standards rather than unit standards. Wyatt Creech has insisted, however, that there will no longer be a dual system of assessment for unit standards and exams. For technology education, moves have already been made to ensure that achievement standards are being developed.

Conclusion

What then of the future? Stuart Middleton in a recent presentation to the TENZA conference feels that in the future many of the technological areas will be integrated into other departments. Biotechnology, electronics and control would become part of the Science department. Food technology would become more a subject in its own right with strong links with Science. Information and Communications Technology would possibly become a cross-curriculum subject taken by all departments (Middleton, 1999). He has no evidence to support this statement other than his own experience. If this eventuated what would happen to the subjects that were left – materials technology, production and process and structures and mechanisms? They would likely revert back to the status that they previously had when they were considered to be purely vocational.

The status of any subject takes time to develop and technology education is more complex than most. It is made up of so many areas and has previously been affiliated to a variety of other subjects. All of these subjects are drawn together by the objectives which cover the three areas of technology – knowledge and understanding, technology capability, and technology and society. The support from the government and industry means that technology education should continue to grow in status. This will depend however on the stranglehold the academic groups have on society.

The way society is operating is changing – there are more opportunities for combining the vocational and academic. *The New Zealand Curriculum Framework* emphasises life long learning and people becoming more in control of their own lives. At present courses at the technical institutes are oversubscribed as people develop degrees using both their academic background and vocational skills. These people are well equipped to take their place in society. The challenge is to ensure that working class people are amongst these groups. The technology curriculum mirrors the trends in society with a combination of vocational and academic, and is well placed to continue to grow in status in schools.

The ultimate status of technology education will be determined by factors outside the control of education. Ten years ago, engineers and technologists received relatively low salaries and were not included in decision-making in business and government. The academics still held positions of power (Medway, 1989). In New Zealand today, engineers and people with technical skills, are starting to gain top positions in companies with commensurate salaries. “The future of NZ technical curricula will not be decided by contests between traditionalists and progressivists. It will be determined to the extent that New Zealand is able to develop and sustain a vigorous industrial knowledge sector economy. To the extent that it does, so will the task of negotiating appropriate curricular reform in New Zealand schools be enhanced" (McKenzie, 1992:38). New Zealand is only going to grow as a nation through people understanding technology subjects and applying their creativity to service niche markets, which will strengthen the country.

Some academic schools will continue to reject technology education because they feel that it is not academic enough, but they are small in numbers and will do so to the disadvantage of their students. The technology curriculum has the power to improve society and provide opportunities for students from a working class background, as well as those from the middle classes to improve their position in life. The curriculum develops a creative knowledge base in people, which will be of greater importance to this generation than in the past. It is up to the individual to create his or her own future – without the confines of a class system (Dale & Ozga, 1993). This curriculum gives

them the core fundamentals to be able to do this. The benefits will accrue when individuals will be able to apply their skills and knowledge to their careers as well as leading fulfilled, enriched lives. The success of these people will ultimately break down the traditional thinking that academics have status over vocational.

References

Anyon, J. (1987). Social Class And The Hidden Curriculum of Work. In E. S. G. Wood (Ed.), Injustice, Ideology and Education . New York: Random House.

Bell, A., & Carpenter, V. (1994). Education's Role in (Re)producing Social Class in Aotearoa. In E. K. Coxon, Jenkins; James, Marshall; Lauran, Massey (Ed.), The politics of Learning and Teaching in Aoteoroa-NewZealand . Palmerston North: Dunmore Press.

Benson, S (1999) Senior Policy Analyst, Ministry of Education, Personal Communication

Bernstein, B. (1971). On the Classification and Framing of Educational Knowledge. In M. F. D. Young (Ed.), Knowledge and Control: New Directions for the Sociology of Education (pp. 47-69). London: Collier-Macmillan Publishers.

Brown, M. (1999, 14-16 April). Towards 2000 - A Ministry perspective, King's College, Auckland.

Codd, J. A. (1996). Higher Education and the Qualifications Framework: A Question of Standards.

Delta: Policy and Practice in Education. Curriculum Reform: The Political Context, 48(1), 57-66.

Creech, H. W. (1998). Secondary School Qualifications Improved and Updated for 21st Century .

Dale, R., & Ozga, J. (1993). Two Hemispheres - Both 'New Right'?: 1980s Education Reform in New Zealand and England and Wales. In B. Lingard, J. Knight, & P. Paige (Eds.), Schooling Reform in Hard Times (pp. 63-87). London: Falmer Press.

Esland, G. M. (1971). Teaching and Learning as the Organization of Knowledge. In M. F. D. Young (Ed.), Knowledge and Control New Directions for the Sociology of Education . London: Collier-Macmillan Publishers.

Gusscott, S. (1996). 1996 Technology Curriculum Auckland/Northland Professional Development Programmes (Milestone Report 2). Auckland: Auckland College of Education.

Hawk, K. (1997). Technology Development Schools, Evaluation, Final Report (Final). Albany: Educational Research and Development Centre, Massey University: Albany Campus.

Jones, A. & Malcolm, C. (1993). A framework for technology education (Working papers from the first phase of the Learning in Technology Education Project). Hamilton: University of Waikato.

Layton, D. (Ed.). (1994). A School Subject in the Making?: The Search for Fundamentals. (Vol. 4). Paris: UNESCO Publishing.

Mawson, B. (1998). Facing the Challenge: Student Teachers, Secondary Schools and Technology. Set (Special), 5/1-4.

McCulloch, G. (1992). Defining and Defending Subjects: The case of the New Zealand Geographical Society. In G. McCulloch (Ed.), The School Curriculum in New Zealand History, Theory, Policy and Practice (pp. 165-184). Palmerston North: The Dunmore Press.

McCulloch, G. (1998). Failing the Ordinary Child? The theory and practice of working-class secondary education. (First ed.). Buckingham: Open University Press.

McGee, C. (1997). Teachers and Curriculum Decision Making. (First ed.). Palmerston North: Dunmore Press.

McKenzie, D. (1992). The Technical Curriculum: Second Class Knowledge? In G. McCulloch (Ed.), The School Curriculum in New Zealand History, Theory, Policy and Practice (pp. 278). Palmerston North: The Dunmore Press.

Medway, P. (1989). Issues in the Theory and Practice of Technology Education. Studies in Science Education, 16, 1-24.

Middleton, S. (1999). Between a Rock and Shifting Sands: Issues of Curriculum Implementation in Secondary Schools. Paper presented at the Telecom Technology Education Conference: Towards Technological Literacy, King's College, Auckland.

Ministry of Education. (1993). Technology in the New Zealand Curriculum DRAFT. Wellington: Learning Media.

Ministry of Education. (1995). Technology in the New Zealand Curriculum. Wellington: Learning Media.

Ministry of Education. (1998). Technology Update 9 . Wellington.

Nolan, P., Openshaw, R., McKinnon, D., & Soler, J. (1992). School-Based Curriculum Innovation: Avoiding the Subject? In M. G. (Ed.), The School Curriculum in New Zealand History, Theory, Policy and Practice . Palmerston North: Dunmore.

O'Neill, A.-M., & Jolley, S. (1996/97). Privatising Curriculum. Constructing Consumer Society. The Technology Curriculum: The Politics of Food - Women's Work? To High Tech or Oblivion. Delta. Policy and Practice in Education, 48, 2, 49, 1, 221-248.

Preston, N., & Symes, C. l. (1992). Schools and Classrooms: A Cultural Analysis of Education. Melbourne: Longman Cheshire.

Technology Education New Zealand. (1997, 22/6/6). Website, [internet] [1999, 6/7/99].

TENZA. (1999a). List of Delegates. Paper presented at the Telecom Technology Education Conference: 'Pathways to Technological Literacy', King's College, Auckland, New Zealand.

TENZA. (1999b). Royal Society of New Zealand. Paper presented at the Telecom Technology Education Conference: 'Pathways to Technological Literacy', King's College, Auckland, New Zealand.

Thwaites, T. (1997 December). Curriculum and Assessment for a "Postmodern Age". Paper presented at the N.Z.A.R.E., Auckland, New Zealand.

Treagust, D. F., & Rennie, L. J. (1993). Implementing Technology in the School Curriclum: A Case Study Involving Six Secondary Schools. Journal of Technology Education, 5(Number 1 Fall), 1-12.

Ward, K. J. (Ed.). (1997). Changing Technology Curriculum Practice. Melbourne: Associated Printers, Morrabin, Victoria.

Young, M. F. D. (1998). The Curriculum of the Future: From the 'new sociology of education to a critical theory of learning'. (First ed.). London: Falmer Press.